FIG.1

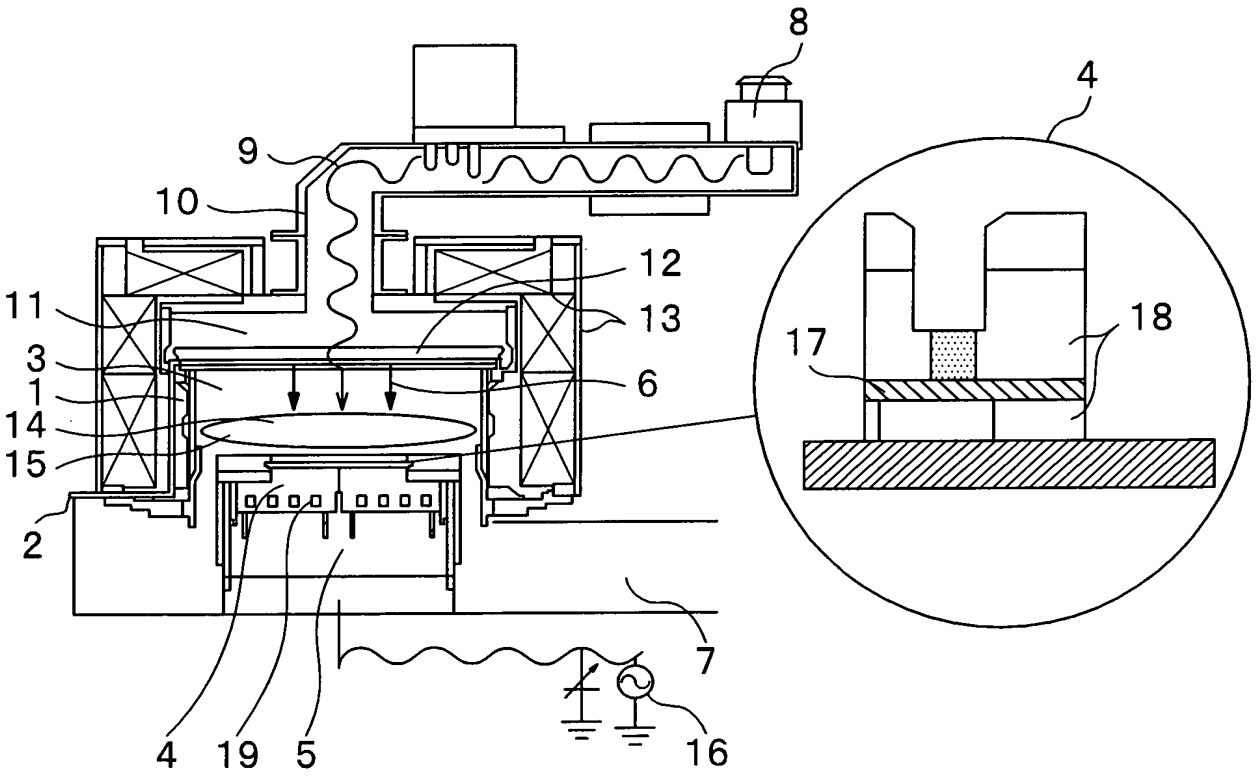


FIG.2

effect	protecting properties for the low-k film	etching properties against the diffusion prevention film	perpendicularity and controlling properties for the processed pattern	controlling properties for the density and temperature of plasma
large	SO_2,SO_3,SOF_2	NF_3,N_2F_4	N_2,NH_3,NOx	increase the electron temperature
	SO_2F_2,SONx	NF_3O	N_2O	in the order of He, Ne, Ar, and Xe
	SH_2	SF_4,SF_6		
	CO_2,CO,O_2			
	C_3O_2	CF_4		increase the density
			HCl,HBr,HF	in the order of Xe, Ar, Ne, and He
small	$SiCl_4$,$SiBr_4$		HI	
		HBr	CHF_3,CH_2F_2	
	CxFy(x/y >1.5)			

FIG.3

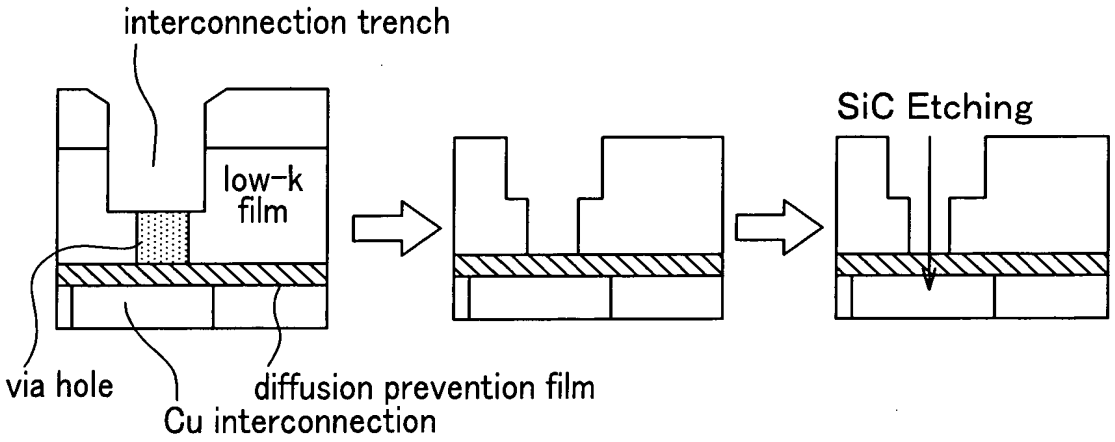

interconnection trench
low-k film
SiC Etching
via hole
Cu interconnection
diffusion prevention film

FIG.4

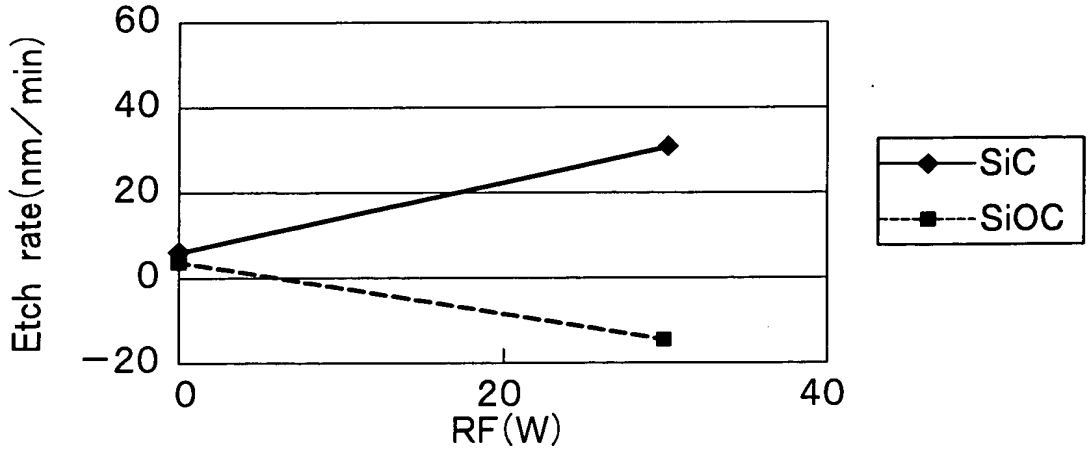

60
40
20
0
−20
Etch rate(nm/min)
0
20
40
RF(W)
SiC
SiOC

FIG.5

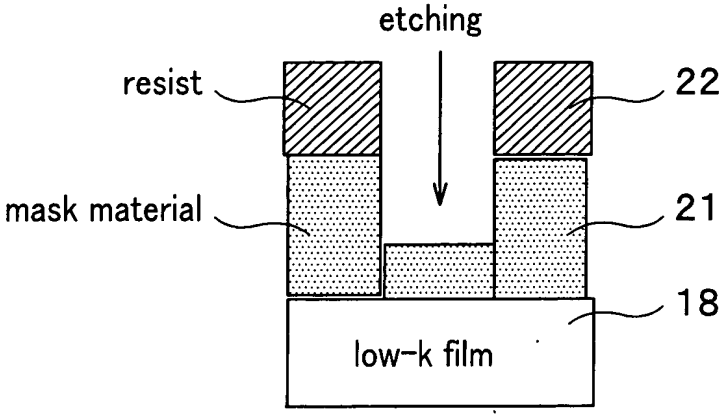


FIG.6

the binding energy between the surface and the product

surface	Si-	C-	O-
product	(eV)	(eV)	(eV)
CF_4	C:-0.04	-0.29	-0.05
	F:1.01		
CF_2	2.71	3.01	3.30
CO	0.75	1.02	1.68
CO_2	C:-0.15	0.12	0.68
	O:0.08	-0.51	0.79
COF_2	0.2	0.22	0.56
SiF_4	-0.04	-0.23	0.13
$SiCl_4$	-0.39	-0.3	1.04
CCl_4	1.73	1.09	1.20
SF_6	1.37	1.89	-0.39
SF_4	2.74	2.74	3.10
NF_3	3.52	1.46	0.95
SO_2	0.95	1.16	1.96
N_2	-0.01	-0.27	-2.31

FIG.7

the binding energy between the surface (Si, C, O, N) and the product

product	Si- (eV)	C- (eV)	O- (eV)	N- (eV)
SO_2	0.95	1.16	1.96	
CO_2	C:-0.07	-0.33	0.69	0.54
	C:0.28	-0.78		
SiF_4	-0.1	-0.03	-0.08	0.34
CF_4	C:-0.04	-0.16	-0.05	-0.01
	F:1.01			
COF_2	C:0.19	0.25	0.56	0.75
	O:0.92	-0.32		
CNF	C:1.49	1.93	2.34	2.12
	N:1.84	1.21		
CNCl	C:1.18	1.53	1.73	1.68
	N:1.52	0.93		
CNH	C:0.83	1.17	1.5	1.35
	N:0.94	0.46		
CO	0.81	1.07	1.68	1.75
CF_2	2.71	3.1	3.29	3.26
SiF_2	1.34	1.98	3.43	2.75
CCl_4	C:1.73	1.09	1.23	1.13
	Cl:1.75			
SiF_2Cl_2	-0.08	-0.29	0.74	0.49
$SiCl_4$	-0.39	-0.4	1.04	0.24
	Cl:0.04			
N_2	-0.01	-0.27	-2.31	-0.68
NF_3	3.89	1.28	0.39	0.93
SiF_2Br_2	-0.19	0.03	0.95	0.71
$SiBr_4$	-0.25	0.28	1.65	0.49

FIG.8

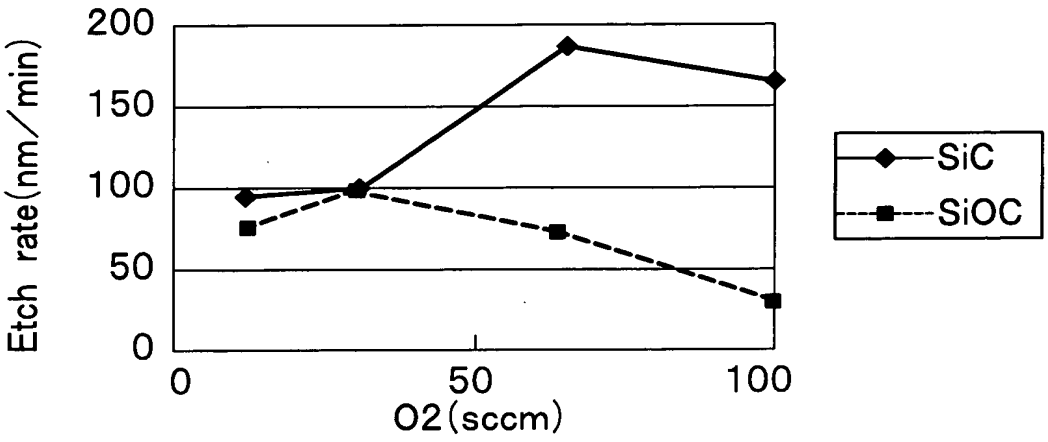
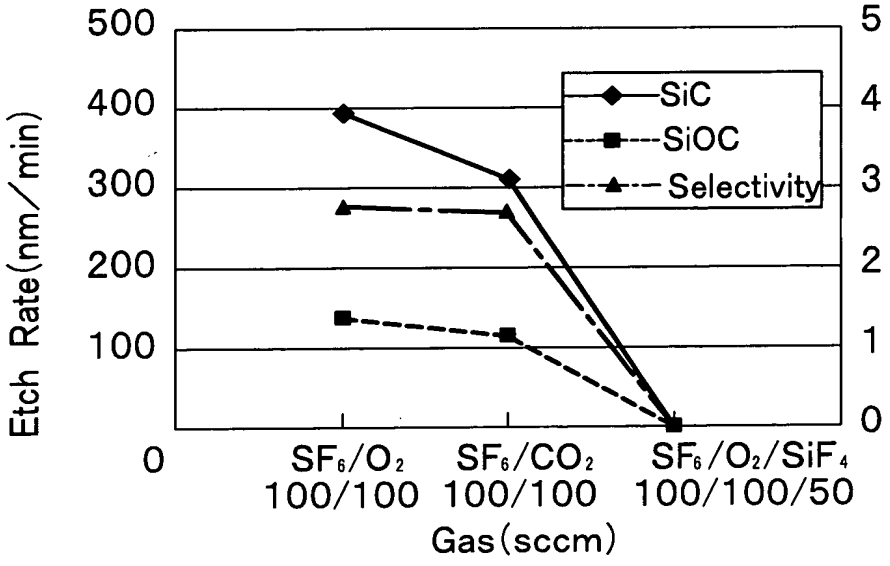

200
150
100
50
0
Etch rate(nm/min)
0
50
100
O2(sccm)
SiC
SiOC

FIG.9


500
400
300
200
100
0
Etch Rate(nm/min)
5
4
3
2
1
0
SiC
SiOC
Selectivity
SF6/O2
100/100
SF6/CO2
100/100
SF6/O2/SiF4
100/100/50
Gas(sccm)